




LAB: Hydrochloric Acid Plus Magnesium

1. Connect the probe to the computer interface. Prepare the computer for data collection by opening the file “01 Endo Exothermic” from the *Chemistry with Computers* folder of *LoggerPro*.
2. Manually rescale the vertical axis to the original temperature scale of -10 to 40°C . To do so, click the mouse on the bottom tickmark and type in “ -10 ”. Then click on the top tickmark and type in “ 40 ”.
3. Measure out 30 mL of HCl solution into the Styrofoam cup. Place the Temperature Probe into the HCl solution. Note: The Temperature Probe must be in the HCl solution for at least 45 seconds before doing Step 11. **CAUTION:** *Hydrochloric acid is caustic. Avoid spilling it on your skin or clothing. Wear chemical splash goggles at all times. Notify your teacher in the event of an accident.*
4. Obtain a piece of magnesium metal from the teacher.
5. Begin data collection by clicking  Collect. After about 20 seconds have elapsed, add the Mg to the HCl solution. Gently stir the solution with the Temperature Probe to ensure good mixing. **CAUTION:** *Do not breathe the vapors!* Collect data until a maximum temperature has been reached and the temperature readings begin to decrease.
6. Dispose of the reaction products as directed by your teacher.
7. To analyze your data:
 - a. Change the appearance of the graph by double-clicking anywhere on the graph bring up the Graph Options dialog. Check the box in front of Point Protector—a point protector will now outline each data point on the graph window in this trial, click the Examine button, . The cursor will become a vertical line. As you move the mouse pointer across the screen, the temperature and time values corresponding to its position will be displayed in the box at the upper-left corner of the graph. Scroll across the initial 3-4 points to determine the initial temperature. Record the initial temperature in the data table. Move the mouse pointer across the peak of the temperature curve to determine the maximum temperature, and record it as the final temperature in your data table. To remove the examine box, click the upper-left corner of the box.
 - b. It is also possible to calculate statistics just for a portion of your collected data. To do so, you must first *select* the data you are interested in. For example, you might want to find the average (or mean) of the first few data points to use as an initial temperature, instead of using the minimum value. Select the flat portion of the curve—move the mouse pointer to time 0 and drag across the flat part of the curve. Now click the Statistics button, , and note the mean temperature value in the statistics box on the graph. This value is the mean of only the selected data points. When you are done, click on the upper-left corner of the statistics box to remove it.
8. Print your graph, and fill in the data table below:

Initial temperature ($^{\circ}\text{C}$)	
Final temperature ($^{\circ}\text{C}$)	
Temperature change ΔT	

Analysis:

1. What product do the bubbles represent?
2. Does this reaction produce or absorb heat?
3. Write a balanced chemical equation for the reaction of hydrochloric acid with magnesium.
4. What type of chemical reaction is it?